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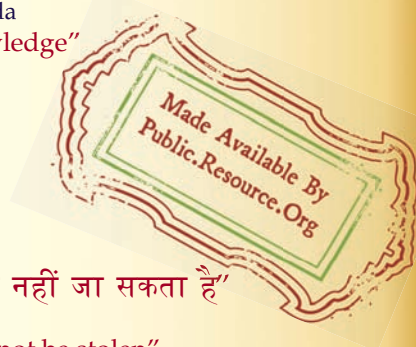
IS 8173 (1984): Propeller Shafts (with keyway) of Diameter 20 to 160 mm [TED 19: Marine Engineering and Safety Aids]



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IS : 8173 - 1984

Indian Standard
SPECIFICATION FOR
PROPELLER SHAFTS (WITH KEYWAY) OF
DIAMETER 20 TO 160 mm
(*First Revision*)

UDC 621.824 : 629.12.037.4



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INDIAN STANDARDS INSTITUTION
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NEW DELHI 110002

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April 1985

AMENDMENT NO. 1 MAY 1993
TO
IS 8173 : 1984 PROPELLER SHAFTS WITH KEYWAY OF
DIAMETER 20 TO 160 mm

(First Revision)

(Page 4, clause 3.1, line 1) — Substitute 'IS 305 : 1981 Aluminium bronze, ingots and castings (*second revision*)' for 'IS 305 : 1961*'.
'

(Page 4, clause 4.3.2) — Substitute the following clause for the existing:

'4.3.2 For 80 mm diameter and above, the key shall be secured by atleast two securing slotted cheese head screws in accordance with IS 1366 : 1982 Slotted cheese head screws (*second revision*).'

(Page 4, clause 4.4, line 3) — Substitute the following Indian Standards for IS 4218 : 1967§ :

IS 4218 (Part 1) : 1976 ISO metric screw threads : Part 1 Basic and design profiles (*first revision*)

IS 4218 (Part 2) : 1976 ISO metric screw threads : Part 2 Diameter pitch combinations (*first revision*)

IS 4218 (Part 3) : 1976 ISO metric screw threads : Part 3 Basic dimensions for design profiles (*first revision*)

IS 4218 (Part 4) : 1976 ISO metric screw threads : Part 4 Tolerancing system (*first revision*)

IS 4218 (Part 5) : 1979 ISO metric screw threads : Part 5 Tolerances (*first revision*)

IS 4218 (Part 6) : 1978 ISO metric screw threads : Part 6 Limits of sizes for commercial bolts and nuts (diameter range 1 to 52 mm) (*first revision*)

(TED 19)

Reprography Unit, BIS, New Delhi, India

Indian Standard

SPECIFICATION FOR PROPELLER SHAFTS (WITH KEYWAY) OF DIAMETER 20 TO 160 mm (*First Revision*)

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Indian Standard
SPECIFICATION FOR
PROPELLER SHAFTS (WITH KEYWAY) OF
DIAMETER 20 TO 160 mm
(*First Revision*)

0. FOREWORD

0.1 This Indian Standard (First Revision) was adopted by the Indian Standards Institution on 30 November 1984, after the draft finalized by the Marine Engineering Sectional Committee had been approved by the Marine, Cargo Movement and Packaging Division Council.

0.2 This standard was first published in 1976. The revision has been necessitated to extend the range of diameters to 160 mm and tolerances on various dimensions have also been included. Further, type of key specified in the earlier version has been omitted to provide as much scope as possible for individual methods of machining.

0.3 The dimensions covered by this standard are only those governing the fit of the propeller on the shaft and the propeller nut on the thread. Nominal dimensions not affecting this, that is shaft diameter, shaft taper length, etc, are stated. For this reason basic rules governing the dimensions have been kept simple. It is felt that simplicity will make for readier acceptance in both workshop and drawing office.

0.4 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS : 2-1960*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

1. SCOPE

1.1 This standard specifies the materials and machining dimensions of propeller shafts from 20 to 160 mm diameter.

*Rules for rounding off numerical values (*revised*).

IS : 8173 - 1984

2. TERMINOLOGY

2.1 For the purpose of this standard, the terms and definitions given in IS : 8215-1976* shall apply, in addition to the following.

2.2 Nominal Diameter — Diameter of the large end of the shaft end taper, which is the same as the diameter of the cylindrical shaft, ignoring tolerances.

2.3 Taper — The conical portion of the shaft end designed to transmit the full propeller shaft torque to the propeller, while allowing for disassembly.

2.4 Thread — The thread cut at the shaft end to which the propeller nut intended to lock the propeller on the taper, is adopted.

3. MATERIAL

3.1 Material conforming to IS : 305-1981†, IS : 6603-1972‡ or other equivalent materials shall be used.

3.2 Keys — Parallel keys conforming to IS : 2048-1983§ shall be used.

4. DIMENSIONS

4.1 Shaft — Various dimensions for propeller shafts shall be as given in Fig. 1 and Table 1.

4.2 Taper — The rate of taper shall be 1 : 10.

4.3 Keyway — Keyway for parallel keys shall be in accordance with IS : 2048-1983§.

4.4 Thread — The thread shall be in accordance with IS : 4218||.

4.5 Thread Fillet — At the bottom of the taper a fillet shall be provided the side of which, situated near the taper, shall have a slope of 30° and the fillet radius, which is sufficient to prevent any breaking risks, shall be as shown in Fig. 1.

*Glossary of terms for ships' propellers.

†Specification for aluminium bronze ingots and castings (*second revision*).

‡Specification for stainless steel bars and flats.

§Specification for parallel keys and keyways (*second revision*).

||ISO metric screw threads (Parts 1 to 6)

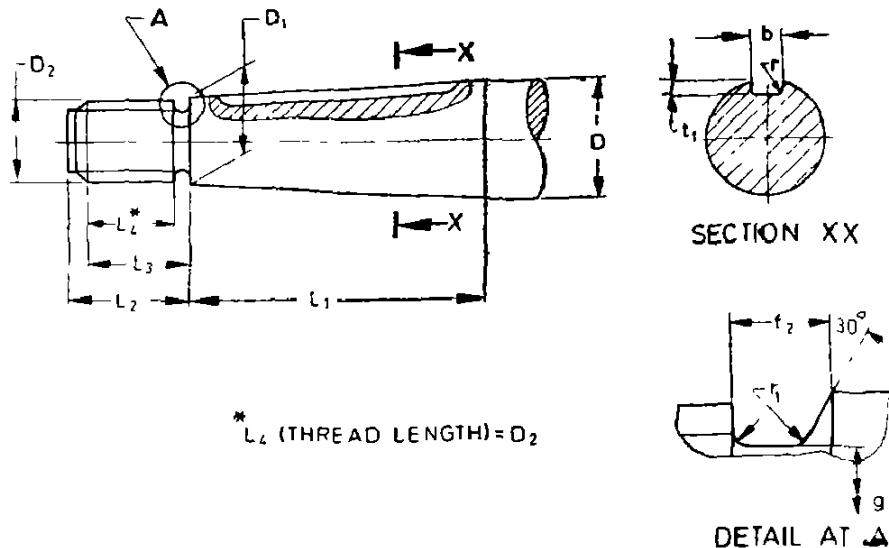


FIG. 1 DIMENSIONS FOR PROPELLER SHAFT

4.6 Shaftend — A cylindrical part shall be provided at the end of the thread to avoid thread deformation in case of shock. This also acts as a guide for locating the nut.

5. TOLERANCES

5.1 External Taper of the Shaft — The value of the diameter D_1 at the small end of the shaft taper shall be as given in Table 1.

5.2 The tolerance on the shaft diameter shall be in accordance with IS : 2102 (Part 1)-1980* for fine deviation.

5.3 Tolerances on Taper — The tolerances on taper shall be 0.010 mm on diameter per 100 mm of length, the sign being positive (+) for the shaft.

5.4 Key and Keyways — The key and keyways limits shall be those given in IS : 2048-1983†.

*General tolerances for dimensions and form and position: Part 1 General tolerances for linear and angular dimensions (second revision)

†Specification for parallel keys and keyways (second revision).

TABLE 1 DIMENSIONS FOR PROPELLER SHAFTS

(Clauses 4.1 and 5.1 and Fig 1)

All dimensions in millimetres

NOMINAL DIA- METER D	D_1		$D_2 \times \text{PITCH}$	L_1	L_2	L_3	KEYWAY			f_0	g	r_1
	Max	Min					b	t_1	r			
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
20	15.5	15.448	M14 $\times$ 1.5	45	25	20	6	3.5	0.20	5.2	11.7	0.75
25	19.5	19.448	M16 $\times$ 1.5	55	25	20	8	4	0.20	5.2	13.7	0.75
30	22.5	22.448	M20 $\times$ 1.5	75	30	25	8	4	0.20	5.2	17.7	0.75
35	26.5	26.448	M24 $\times$ 2	85	35	30	10	5	0.30	7	21	1.00
40	30.5	30.448	M24 $\times$ 2	95	35	30	12	5	0.30	7	21	1.00
45	34.5	34.438	M30 $\times$ 2	105	40	35	14	5.5	0.30	7	27	1.00
50	38.5	38.438	M36 $\times$ 3 (M30 $\times$ 3)	115	45	40	14	5.5	0.30	10.5	31.6 (25.6)	1.5
(55)	43.0	42.926	M36 $\times$ 3	120	45	40	16	6	0.30	10.5	31.6	1.5
60	47.0	46.926	M42 $\times$ 3	130	55	50	18	7	0.30	10.5	37.6	1.5
(65)	51.0	50.926	M42 $\times$ 3	140	55	50	18	7	0.30	10.5	37.6	1.5
70	55.0	54.926	M48 $\times$ 3	150	60	55	20	7.5	0.50	10.5	43.6	1.5
(75)	58.5	58.426	M48 $\times$ 3	165	60	55	20	7.5	0.50	10.5	43.6	1.5
80	62.5	62.426	M56 $\times$ 4	175	70	65	22	9	0.50	14	50.3	2.0
(85)	66.5	66.413	M56 $\times$ 4	185	70	65	22	9	0.50	14	50.3	2.0
90	71.0	70.913	M64 $\times$ 4 (M56 $\times$ 4)	190	75	70	25	9	0.50	14	58.0 (50.3)	2.0
(95)	75.0	74.913	M64 $\times$ 4 (M56 $\times$ 4)	200	75	70	25	9	0.50	14	58.3 (50.3)	2.0
100	78.5	78.413	M72 $\times$ 4 (M64 $\times$ 4)	215	85	80	28	10	0.50	14	66.3 (58.3)	2.0
110	86.5	86.413	M80 $\times$ 4 (M72 $\times$ 4)	235	90	85	28	10	0.50	14	74.3 (66.3)	2.0
120	94.5	93.413	M90 $\times$ 4 (M80 $\times$ 4)	255	95	90	32	11	0.50	14	84.3 (74.3)	2.0
130	102.5	101.413	M100 $\times$ 4 (M90 $\times$ 4)	275	105	100	32	11	0.50	14	94.3 (84.3)	2.0
140	110.5	109.413	M100 $\times$ 4 (M90 $\times$ 4)	295	105	100	36	12	0.85	14	94.3 (84.3)	2.0
150	118.5	117.413	M110 $\times$ 4 (M100 $\times$ 4)	315	115	110	36	12	0.85	14	104.3 (94.3)	2.0
160	126.5	126.413	M120 $\times$ 4 (M110 $\times$ 4)	335	125	120	40	13	0.85	14	114.3 (104.3)	2.0

NOTE—Values given in parentheses are non-preferred sizes.

6. CONSTRUCTIONAL DETAILS

6.1 Details indicated in the figure are not intended to restrict design nor are they to scale. Types and methods of construction or other optional details, like safety pin hole, centering point, etc, are left open for individual methods to comply with the configuration of the coupling and particular needs.

6.2 Length of the thread L_4 shall be equal to the thread diameter D_2 . The part of the thread engaged by the propeller nut shall be not less than 80 percent of the thread length.

6.2.1 The nut shall be properly locked.

6.3 The distance between the larger end of the taper and the front of the keyway shall not be less than 20 percent of the shaft diameter.

6.3.1 For 80 mm diameter and above, the key shall be secured by a slotted cheese head screw in accordance with IS : 1366-1982*.

6.3.2 The screw shall preferably be located beyond the forward third of the taper.

6.3.3 A tapping hole shall be provided for removal of the key.

6.3.4 The key shall be a good fit in the keyway.

6.3.5 The key and keyway shall not have sharp edges. The keyways shall be of round ended or sled runner type with adequate fillet radii.

6.4 Machining — Shaft taper and all contact parts shall be fine machined to a surface finish $\nabla (1.6-6.3 \mu\text{m})$ in accordance with IS : 3073-1967†.

7. DESIGNATION

7.1 The propeller shafts shall be designated by shaft material, diameter and number of this standard.

Example:

An aluminium bronze propeller shaft having diameter 40 mm shall be designated as:

Aluminium bronze propeller shaft 40 IS : 8173-1984.

*Specification for slotted cheese head screws (second revision)

†Assessment of surface roughness

INTERNATIONAL SYSTEM OF UNITS (SI UNITS)

Base Units

QUANTITY	UNIT	SYMBOL
Length	metre	m
Mass	kilogram	kg
Time	second	s
Electric current	ampere	A
Thermodynamic temperature	kelvin	K
Luminous intensity	candela	cd
Amount of substance	mole	mol

Supplementary Units

QUANTITY	UNIT	SYMBOL
Plane angle	radian	rad
Solid angle	steradian	sr

Derived Units

QUANTITY	UNIT	SYMBOL	DEFINITION
Force	newton	N	$1 \text{ N} = 1 \text{ kg.m/s}^2$
Energy	joule	J	$1 \text{ J} = 1 \text{ N.m}$
Power	watt	W	$1 \text{ W} = 1 \text{ J/s}$
Flux	weber	Wb	$1 \text{ Wb} = 1 \text{ V.s}$
Flux density	tesla	T	$1 \text{ T} = 1 \text{ Wb/m}^2$
Frequency	hertz	Hz	$1 \text{ Hz} = 1 \text{ c/s (s}^{-1}\text{)}$
Electric conductance	siemens	S	$1 \text{ S} = 1 \text{ A/V}$
Electromotive force	volt	V	$1 \text{ V} = 1 \text{ W/A}$
Pressure, stress	pascal	Pa	$1 \text{ Pa} = 1 \text{ N/m}^2$



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